

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
22 April 2004 (22.04.2004)

PCT

(10) International Publication Number  
**WO 2004/032754 A3**

(51) International Patent Classification<sup>7</sup>: **A61B 17/072**

(21) International Application Number:  
PCT/US2003/031653

(22) International Filing Date: 6 October 2003 (06.10.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/416,056 4 October 2002 (04.10.2002) US

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(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC,  
SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA,  
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,  
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

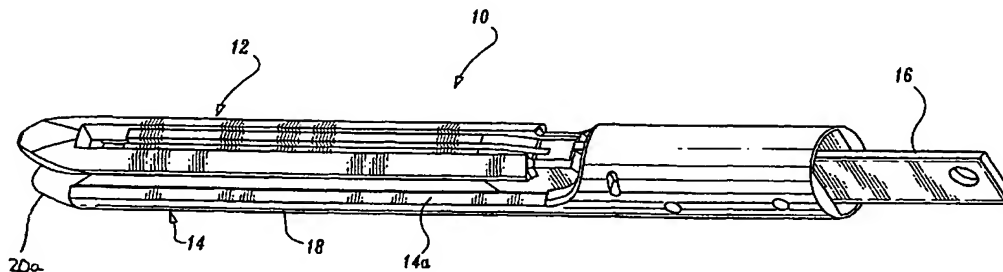
Published:

— with international search report

(88) Date of publication of the international search report:  
1 July 2004

For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: **TOOL ASSEMBLY FOR SURGICAL STAPLING DEVICE**



(57) Abstract: A tool assembly having a pair of jaws is disclosed. Each of the jaws has a proximal end and a distal end and the first jaw is movable in relation to the second jaw between a spaced position and an approximated position. First and second cam followers are supported on the first jaw. An approximation member is movable in relation to the first jaw and includes at least one cam surface positioned to engage the first and second cam followers. The approximation member is movable in relation to the first jaw to move the at least one cam surface in relation to the first and second cam followers to effect movement of the first and second jaws from the spaced position to the approximated position. The at least one cam channel is configured to approximate the distal ends of the first and second jaws prior to approximation of the proximal ends of the first and second jaws. In another preferred embodiment, the tool assembly includes an articulation and firing actuator. The articulation and firing actuator includes a flexible band having a first end portion extending at least partially through the body portion and through the cartridge assembly, a central portion extending from the first end portion operably associated with the dynamic clamping member and a second end portion extending from the central portion through the cartridge assembly and at least partially through the body portion to a position adjacent the first end. The articulation and firing actuator is operably associated with the tool assembly such that movement of either the first end portion or the second end portion of the flexible band proximally and independently of the other end portion effects pivoting of the tool assembly in relation to the body portion, and movement of both the first and second end portions of the flexible band simultaneously effects movement of the dynamic clamping member to eject the staples from the cartridge assembly.

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 03/31653

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61B17/072

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 749 893 A (REDMOND RUSSELL J ET AL) 12 May 1998 (1998-05-12)	1-4, 11, 16
Y	column 3, line 38 - line 58 column 8, line 6 - column 10, line 62 figures 13-18	9, 10
X	US 5 535 935 A (MINCK JR JOHN L ET AL) 16 July 1996 (1996-07-16)	1-8, 11, 16
	column 10, line 39 - line 52 column 13, line 22 - line 65 figures 2, 3	
Y	US 5 725 536 A (OBERLIN JEFFREY R ET AL) 10 March 1998 (1998-03-10)	9, 10
	column 8, line 17 - line 29 figures 25, 26, 31	
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

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\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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\*G\* document member of the same patent family

Date of the actual completion of the international search

26 March 2004

Date of mailing of the international search report

- 7. 04. 2004

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International Application No

PCT/US 03/31653

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 800 792 A (ETHICON INC) 15 October 1997 (1997-10-15) column 10, line 8 -column 12, line 56 figures 1-8 -----	12-15
A	US 2001/030219 A1 (PALMER MITCHELL J ET AL) 18 October 2001 (2001-10-18) page 1, paragraph 12 -page 2, paragraph 14 figure 31 -----	12-15

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US 03/31653

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

**FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210**

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-11,16

Surgical tool assembly having a pair of jaws movable relative to each other between an open and closed position. The pair of jaws having a camming arrangement such that when the jaws are actuated to close, the distal ends of the pair of jaws meet first. This prevents the tissue which is being clamped between the jaws from slipping distally when the said pair of jaws move to a closed position.

2. Claims: 12-15

Surgical stapler having a pivoting joint at the distal end prior to the clamping/stapling jaws. The device having an actuator which selectively pivots said jaws or ejects the staples in said jaws. This reduces the complexity of the actuation mechanism within the device and simplifies the operation of the tool in general for the practitioner as one actuator now performs two functions.

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/31653

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5749893	A	12-05-1998	CA 2159348 A1	10-11-1994
			DE 69414244 D1	03-12-1998
			DE 69414244 T2	22-04-1999
			EP 0696179 A1	14-02-1996
			ES 2122282 T3	16-12-1998
			JP 8509635 T	15-10-1996
			WO 9424947 A1	10-11-1994
US 5535935	A	16-07-1996	US 5489058 A	06-02-1996
			AU 2385295 A	29-11-1995
			CA 2185154 A1	09-11-1995
			DE 69531987 D1	27-11-2003
			EP 1382303 A1	21-01-2004
			EP 1382304 A1	21-01-2004
			EP 1382305 A1	21-01-2004
			EP 0749288 A1	27-12-1996
			WO 9529638 A2	09-11-1995
			US 5816471 A	06-10-1998
			US 5586711 A	24-12-1996
US 5725536	A	10-03-1998	NONE	
EP 0800792	A	15-10-1997	US 5507773 A	16-04-1996
			EP 0800792 A1	15-10-1997
			AT 165724 T	15-05-1998
			AU 681733 B2	04-09-1997
			AU 1226795 A	31-08-1995
			CA 2142633 A1	19-08-1995
			DE 69502309 D1	10-06-1998
			EP 0668057 A2	23-08-1995
			JP 8033628 A	06-02-1996
			US 5562700 A	08-10-1996
			US 5562701 A	08-10-1996
			US 5562702 A	08-10-1996
US 2001030219	A1	18-10-2001	US 6250532 B1	26-06-2001
			US 5711472 A	27-01-1998
			US 5312023 A	17-05-1994
			US 5326013 A	05-07-1994
			US 2002096550 A1	25-07-2002
			AU 671292 B2	22-08-1996
			AU 4757793 A	14-04-1994
			CA 2103969 A1	24-03-1994
			CA 2191494 A1	24-03-1994
			DE 69322241 D1	07-01-1999
			DE 69322241 T2	20-05-1999
			EP 0603472 A2	29-06-1994
			ES 2123603 T3	16-01-1999
			JP 6189969 A	12-07-1994
			US 5478003 A	26-12-1995
			US 5645209 A	08-07-1997
			US 5647526 A	15-07-1997
			US 5456401 A	10-10-1995
			US 5482197 A	09-01-1996
			AU 657364 B2	09-03-1995
			AU 2611792 A	22-04-1993
			CA 2080160 A1	19-04-1993
			CA 2426279 A1	19-04-1993

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/31653

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2001030219 A1		DE 69223937 D1	12-02-1998
		DE 69223937 T2	28-05-1998
		DE 552423 T1	25-11-1993
		EP 0552423 A2	28-07-1993
		ES 2042445 T1	16-12-1993
		JP 3332965 B2	07-10-2002
		JP 5200038 A	10-08-1993
		US 5397046 A	14-03-1995
		US 5364001 A	15-11-1994
		US 5431322 A	11-07-1995
		US 5472132 A	05-12-1995
		US 5584425 A	17-12-1996
		US 5636780 A	10-06-1997